



EXHIBIT IV.1 - CALPERS CONCEPTUAL TARGET ARCHITECTURE VISION

Enterprise technology architecture (ETA) defines the overall form and function of business and Information Technology (IT) systems across an enterprise, including partners and organizations that form the extended enterprise. The ETA provides a framework of principles, recommended practices, guidelines, policies, standards, and products, which direct the design, analysis, construction, deployment, and management of IT and systems across the enterprise.

The objective of the architecture is to guide the business and IT organization in the implementation of a technical infrastructure, which supports change in the business, and the administrative processes of the enterprise. CalPERS recognizes that it is important to build the enterprise architecture not only for today's needs and tomorrow's known needs, but also for tomorrow's unknown needs. The technical environment at CalPERS must be both expandable and built for change.

CalPERS primary goals for the ETA are to provide an architecture where CalPERS systems, applications, and infrastructure work together to provide a technical environment that is flexible, extendible, reliable, maintainable, and supportive of innovation solutions.

In today's competitive environment, effective and efficient use of IT is a key focus in building successful business strategies. ETA creates the framework for this leveraged use of technology. Establishing an ETA serves four basic functions for CalPERS:

1. Creates a set of principles that guide future IT decision-making, business driver impact analysis, technology analysis and selection, and application design;
2. Provides the process for building consensus among business owners and the CalPERS divisions that develop IT solutions, and establishes an enterprise-wide ongoing working relationship for the continuous alignment of IT initiatives with established architectural policies, principles, practices, and standards;
3. Implements information systems in the context of a well-defined architecture; and
4. Guides the acquisition and development of technology and provides a common structure, which enables sustainable competitive advantage for the enterprise through periods of rapid change.

The scope of the enterprise technology architecture is to provide a single, common and cohesive vision to executive management, business managers, IT managers, IT staff, and end users of the underpinnings, design points, principles, and recommended practices of CalPERS adaptive enterprise technical architecture.

A. Application Architecture Conceptual Model

The target application architecture defines how applications are designed and how they cooperate. Application architecture promotes common presentation standards to facilitate rapid design, training, and implementation of new applications and functions. High quality application architecture enables a high level of system integration, reuse of



components, and rapid deployment of applications in response to changing business requirements.

B. CalPERS Target Architectural Vision

The target architectural vision for CalPERS architecture is based on a number of interrelated business and IT goals:

- Provides an architecture that is applicable to small projects, yet robust enough to support enterprise-wide large scale projects;
- Enables developers to quickly deploy business applications;
- Enables developers to concentrate on the business aspects of applications; and,
- Frees developers up from having to worry about the underlying technologies.

From the CalPERS architecture principles and these initial high-level goals, the following key strategies of the CalPERS target architecture have been identified:

- The architecture must be built to be resilient to change;
- The architecture and the applications built using the architecture must be cost effective to maintain;
- The architecture must support open standards;
- The architecture must be designed to be technology independent;
- The architecture and application interfaces must be highly-granular and loosely coupled to promote reuse; and,
- The architecture must be implemented in a multi-layers architecture with firm logical boundaries that separate the services and components.

1. Underlying Technology

Constantly having to rewrite application code to adapt to new technology platform or to take advantage of the latest technology, is both time consuming and expensive. Making such changes to applications tends to cascade through the entire application. Ideally, there should be a clear separation of responsibilities between business applications and the underlying technology architecture. To deal with these issues, the CalPERS target architecture has been designed to encapsulate the underlying technology for the applications systems.



2. Provide the Core

CalPERS target architecture recognizes that applications, regardless of how they have been designed and implemented, share many common elements (i.e., the need for security, integration, reporting, logging, messaging, workflow, etc.). The CalPERS target architecture emphasizes the need to identify these common business and technical services, and focuses on the development of a set of common shared global services to meet common business system needs.

3. Service Reuse

CalPERS target architecture is designed to focus on services level reuse which requires complete encapsulation from the implementation of the service. CalPERS environment is heterogeneous both in hardware and software. Accordingly the interoperability requirements for those must be addressed for Service Reuse to be achieved. As CalPERS moves to define an application as a loosely coupled collection of services, a greater burden must be placed on the design and implementation of services destined for reuse. This implies that the designs be able to define their service capabilities with respect to security, performance, and availability.

4. Layer Architecture

An architectural layer is where the system design defines layers that provide a separation of concerns. In an n-tier architecture, these layers are usually referred to as the business layer, the interface layer, the application layer, the information or data layer, and the security layer. For each of these layers, a clearly defined set of interfaces are typically defined. The following diagram illustrates CalPERS desired architecture layering. A brief description of each of the layers presented on this diagram follows:

(a) Presentation Layer

The Presentation layer conveys the idea that users should have a single point of access for related functions that they use. This might be implemented as one or more portals.

(b) Presentation Integration Layer

The Presentation Integration layer encapsulates all the presentation logic required to service the clients accessing the system. The presentation tier intercepts client request, controls flow, and controls access to business services.

(c) Business Services Layer

The Business Services layer is responsible for exposing the business services in a consistent manner while enabling services to be implemented in a variety of technologies. Ideally it should also define the



standard contract for a service type, therefore allowing substitution of service implementation without affecting clients of the service.

(d) Business Layer

The Business layer shows groupings of business functions that are built for specific purposes. By leveraging services available in the architecture, applications should generally be quicker to develop and easier to maintain.

(e) Service Integration Layer

The Service Integration layer is responsible for exposing the services in the architecture in a consistent manner while enabling services to be implemented in a variety of technologies. Ideally it should also define the standard contract for a service type, therefore allowing substitution of service implementation without affecting clients of the service.

(f) Services Layer

The Services layer represents the separation of re-usable services from application logic. The services layer will thus consist of services with clearly defined contracts that can be used by any application. The services have initially been classified in to three major groupings: Core Services for technical and basic services, administrative for services that provide access to administrative data or processes, and Business Services for services specific to domains.

(g) Security Services Layer

The Security Services layer, while conceptually similar to other types of services, has been shown separately because it has significant impacts at all levels within the architecture. It will be necessary to apply access and control security to data, to services, to applications, and finally to user interfaces.

**CalPERS Conceptual Target Architecture Vision**